SEQUENCE LISTING

<110> THE JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE
LEE, Se-Jin
ESQUELA, Aurora F.

<120> METHODS OF DETECTING LIVER CELLS EXPRESSING GROWTH DIFFERENTIATION FACTOR-12

<130> JHU1220-4

<140> US 09/361,655
<141> 1999-07-27

<150> US 08/765,662
<151> 1997-04-28

<150> PCT/ US95/08745
<151> 1995-07-12

<150> US 08/274,215
<151> 1994-07-13

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<170> PatentIn version 3.1

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tgc agg cga gac cat tac gta gac ttc cag gaa ctg gga tgg cgg gac   96
Cys Arg Arg Asp His Tyr Val Asp Phe Gln Glu Leu Gly Trp Arg Asp
                20   25   30

tgg ata ctg cag ccc gag ggg tac cag ctg aat tac tgc agt ggg cag   144
Trp Ile Leu Gln Pro Glu Gly Tyr Gln Leu Asn Tyr Cys Ser Gly Gln
        35   40   45

tgc cct ccc cac ctg gct ggc agc cca ggc att gct gcc tct ttc cat   192
Cys Pro Pro His Leu Ala Gly Ser Pro Gly Ile Ala Ala Ser Phe His
    50   55   60

tct gcc gtc ttc agc ctc ctc aaa gcc aac aat cct tgg cct gcc agt   240
Ser Ala Val Phe Ser Leu Leu Lys Ala Asn Asn Pro Trp Pro Ala Ser
65   70   75   80

acc tcc tgt tgt gtc cct act gcc cga agg ccc ctc tct ctc ctc tac   288
Thr Ser Cys Cys Val Pro Thr Ala Arg Arg Pro Leu Ser Leu Leu Tyr
                85   90   95

ctg gat cat aat ggc aat gtg gtc aag acg gat gtg cca gat atg gtg   336

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Leu Asp His Asn Gly Asn Val Val Lys Thr Asp Val Pro Asp Met Val
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gtg gag gcc tgt ggc tgc agc tag                                      360
Val Glu Ala Cys Gly Cys Ser
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            20              25              30

Trp Ile Leu Gln Pro Glu Gly Tyr Gln Leu Asn Tyr Cys Ser Gly Gln
        35              40              45

Cys Pro Pro His Leu Ala Gly Ser Pro Gly Ile Ala Ala Ser Phe His
    50              55              60

Ser Ala Val Phe Ser Leu Leu Lys Ala Asn Asn Pro Trp Pro Ala Ser
65              70              75              80

Thr Ser Cys Cys Val Pro Thr Ala Arg Arg Pro Leu Ser Leu Leu Tyr
            85              90              95

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Val Glu Ala Cys Gly Cys Ser
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atccgaggct cctgaaccag ggccattcac caggagc atg cgg ctc cct gat gtc        235
                                           Met Arg Leu Pro Asp Val
                                           1               5

cag ctc tgg ctg gtg ctg ctg tgg gca ctg gtg cga gca cag ggg aca        283
Gln Leu Trp Leu Val Leu Leu Trp Ala Leu Val Arg Ala Gln Gly Thr
            10              15              20

ggg tct gtg tgt ccc tcc tgt ggg ggc tcc aaa ctg gca ccc caa gca        331
Gly Ser Val Cys Pro Ser Cys Gly Gly Ser Lys Leu Ala Pro Gln Ala
        25              30              35

gaa cga gct ctg gtg ctg gag cta gcc aag cag caa atc ctg gat ggg        379
Glu Arg Ala Leu Val Leu Glu Leu Ala Lys Gln Gln Ile Leu Asp Gly
    40              45              50

ttg cac ctg acc agt cgt ccc aga ata act cat cct cca ccc cag gca        427
Leu His Leu Thr Ser Arg Pro Arg Ile Thr His Pro Pro Pro Gln Ala
55              60              65              70

gcg ctg acc aga gcc ctc cgg aga cta cag cca ggg agt gtg gct cca        475
Ala Leu Thr Arg Ala Leu Arg Arg Leu Gln Pro Gly Ser Val Ala Pro
            75              80              85

ggg aat ggg gag gag gtc atc agc ttt gct act gtc aca gac tcc act        523
Gly Asn Gly Glu Glu Val Ile Ser Phe Ala Thr Val Thr Asp Ser Thr
            90              95              100

tca gcc tac agc tcc ctg ctc act ttt cac ctg tcc act cct cgg tcc        571
Ser Ala Tyr Ser Ser Leu Leu Thr Phe His Leu Ser Thr Pro Arg Ser
            105             110             115

cac cac ctg tac cat gcc cgc ctg tgg ctg cac gtg ctc ccc acc ctt        619
His His Leu Tyr His Ala Arg Leu Trp Leu His Val Leu Pro Thr Leu
    120             125             130

cct ggc act ctt tgc ttg agg atc ttc cga tgg gga cca agg agg agg        667
Pro Gly Thr Leu Cys Leu Arg Ile Phe Arg Trp Gly Pro Arg Arg Arg
135             140             145             150

cgc caa ggg tcc cgc act ctc ctg gct gag cac cac atc acc aac ctg        715
Arg Gln Gly Ser Arg Thr Leu Leu Ala Glu His His Ile Thr Asn Leu
            155             160             165

ggc tgg cat acc tta act ctg ccc tct agt ggc ttg agg ggt gag aag        763
Gly Trp His Thr Leu Thr Leu Pro Ser Ser Gly Leu Arg Gly Glu Lys
            170             175             180

tct ggt gtc ctg aaa ctg caa cta gac tgc aga ccc cta gaa ggc aac        811
Ser Gly Val Leu Lys Leu Gln Leu Asp Cys Arg Pro Leu Glu Gly Asn
            185             190             195

agc aca gtt act gga caa ccg agg cgg ctc ttg gac aca gca gga cac        859
Ser Thr Val Thr Gly Gln Pro Arg Arg Leu Leu Asp Thr Ala Gly His
            200             205             210

cag cag ccc ttc cta gag ctt aag atc cga gcc aat gag cct gga gca        907
Gln Gln Pro Phe Leu Glu Leu Lys Ile Arg Ala Asn Glu Pro Gly Ala
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ggc cgg gcc agg agg agg acc ccc acc tgt gag cct gcg acc ccc tta      955
Gly Arg Ala Arg Arg Arg Thr Pro Thr Cys Glu Pro Ala Thr Pro Leu
                235               240               245

tgt tgc agg cga gac cat tac gta gac ttc cag gaa ctg gga tgg cgg     1003
Cys Cys Arg Arg Asp His Tyr Val Asp Phe Gln Glu Leu Gly Trp Arg
            250               255               260

gac tgg ata ctg cag ccc gag ggg tac cag ctg aat tac tgc agt ggg     1051
Asp Trp Ile Leu Gln Pro Glu Gly Tyr Gln Leu Asn Tyr Cys Ser Gly
            265               270               275

cag tgc cct ccc cac ctg gct ggc agc cca ggc att gct gcc tct ttc     1099
Gln Cys Pro Pro His Leu Ala Gly Ser Pro Gly Ile Ala Ala Ser Phe
        280               285               290

cat tct gcc gtc ttc agc ctc ctc aaa gcc aac aat cct tgg cct gcc     1147
His Ser Ala Val Phe Ser Leu Leu Lys Ala Asn Asn Pro Trp Pro Ala
295               300               305               310

agt acc tcc tgt tgt gtc cct act gcc cga agg ccc ctc tct ctc ctc     1195
Ser Thr Ser Cys Cys Val Pro Thr Ala Arg Arg Pro Leu Ser Leu Leu
            315               320               325

tac ctg gat cat aat ggc aat gtg gtc aag acg gat gtg cca gat atg     1243
Tyr Leu Asp His Asn Gly Asn Val Val Lys Thr Asp Val Pro Asp Met
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gtg gtg gag gcc tgt ggc tgc agc tagcaagagg acctggggct ttggagtgaa     1297
Val Val Glu Ala Cys Gly Cys Ser
        345               350

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cctgtgagaa gatgtcaggg actagggagg gagggaggga aggcagagaa aaattactta    1597

gcctctccca agatgagaaa gtcctcaagt gaggggagga ggaagcagat agatggtcca    1657

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ggaaggtcaa gagggagatg ggcaaggcgc tgagggagga tgcttagggg accccagaa     1777

acaggagtca ggaaaatgag gcactaagcc taagaagttc cctggttttt cccaggggac    1837

aggacccact gggagacaag catttatact ttctttcttc ttttttattt ttttgagatc    1897

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gcccactaat ttttgtattc ttagtagaaa cgaggtttca acatgttggc caggatggtc    2077

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aatactaaca tgttatttgc cttttgaatt ctcattatct taaaattgta ttgtggagtt    2377

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Lys Leu Ala Pro Gln Ala Glu Arg Ala Leu Val Leu Glu Leu Ala Lys
            35                  40                  45


Gln Gln Ile Leu Asp Gly Leu His Leu Thr Ser Arg Pro Arg Ile Thr
        50                  55                  60


His Pro Pro Pro Gln Ala Ala Leu Thr Arg Ala Leu Arg Arg Leu Gln
65                  70                  75                  80


Pro Gly Ser Val Ala Pro Gly Asn Gly Glu Glu Val Ile Ser Phe Ala
                85                  90                  95


Thr Val Thr Asp Ser Thr Ser Ala Tyr Ser Ser Leu Leu Thr Phe His
                100                 105                 110


Leu Ser Thr Pro Arg Ser His His Leu Tyr His Ala Arg Leu Trp Leu
            115                 120                 125


His Val Leu Pro Thr Leu Pro Gly Thr Leu Cys Leu Arg Ile Phe Arg
        130                 135                 140


Trp Gly Pro Arg Arg Arg Gln Gly Ser Arg Thr Leu Leu Ala Glu
145                 150                 155                 160


His His Ile Thr Asn Leu Gly Trp His Thr Leu Thr Leu Pro Ser Ser
                165                 170                 175
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Gly Leu Arg Gly Glu Lys Ser Gly Val Leu Lys Leu Gln Leu Asp Cys
        180   185   190

Arg Pro Leu Glu Gly Asn Ser Thr Val Thr Gly Gln Pro Arg Arg Leu
        195   200   205

Leu Asp Thr Ala Gly His Gln Gln Pro Phe Leu Glu Leu Lys Ile Arg
        210   215   220

Ala Asn Glu Pro Gly Ala Gly Arg Ala Arg Arg Arg Thr Pro Thr Cys
225   230   235   240

Glu Pro Ala Thr Pro Leu Cys Cys Arg Arg Asp His Tyr Val Asp Phe
             245   250   255

Gln Glu Leu Gly Trp Arg Asp Trp Ile Leu Gln Pro Glu Gly Tyr Gln
        260   265   270

Leu Asn Tyr Cys Ser Gly Gln Cys Pro Pro His Leu Ala Gly Ser Pro
        275   280   285

Gly Ile Ala Ala Ser Phe His Ser Ala Val Phe Ser Leu Leu Lys Ala
        290   295   300

Asn Asn Pro Trp Pro Ala Ser Thr Ser Cys Cys Val Pro Thr Ala Arg
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Arg Pro Leu Ser Leu Leu Tyr Leu Asp His Asn Gly Asn Val Val Lys
             325   330   335

Thr Asp Val Pro Asp Met Val Val Glu Ala Cys Gly Cys Ser
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